Low Level RF Control System Update

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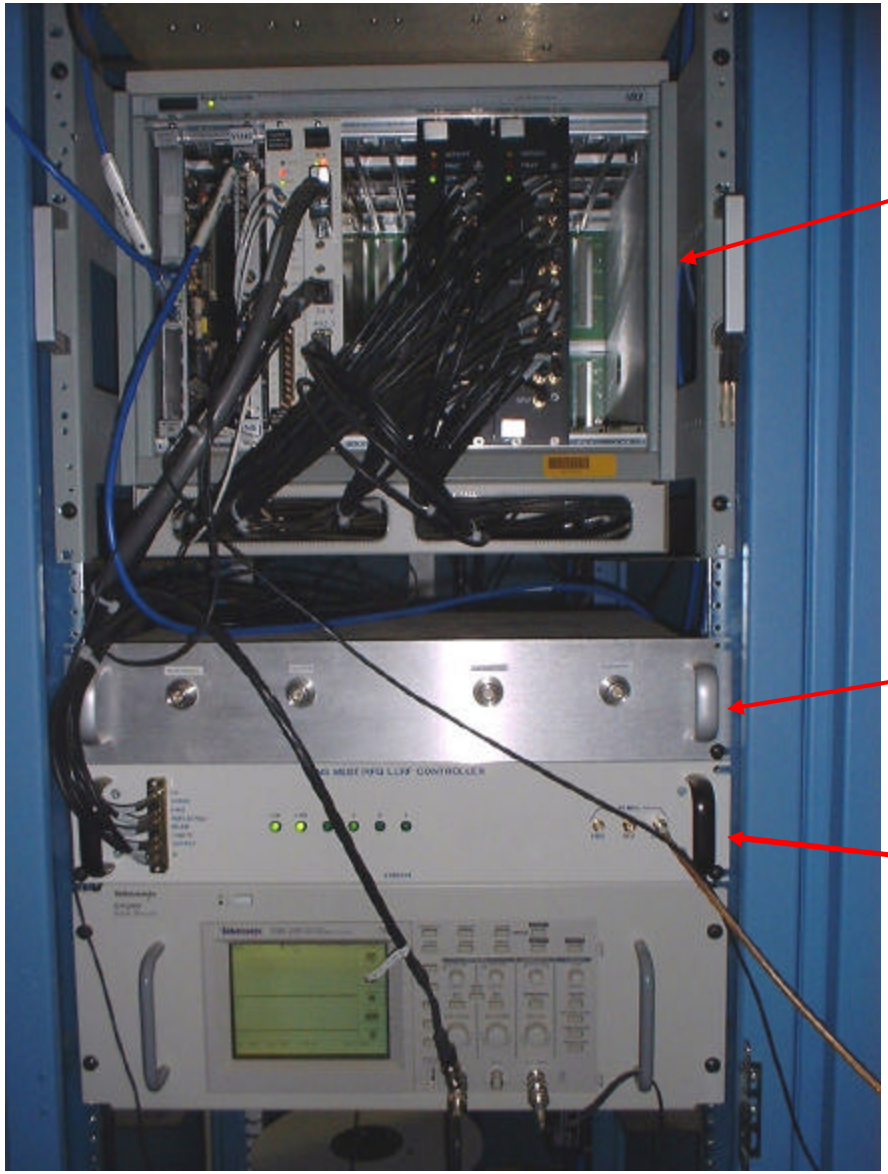
August 5, 2003

RFQ, DTL1 & DTL3 LLRF Control Systems are Tested and Ready to Support Operations



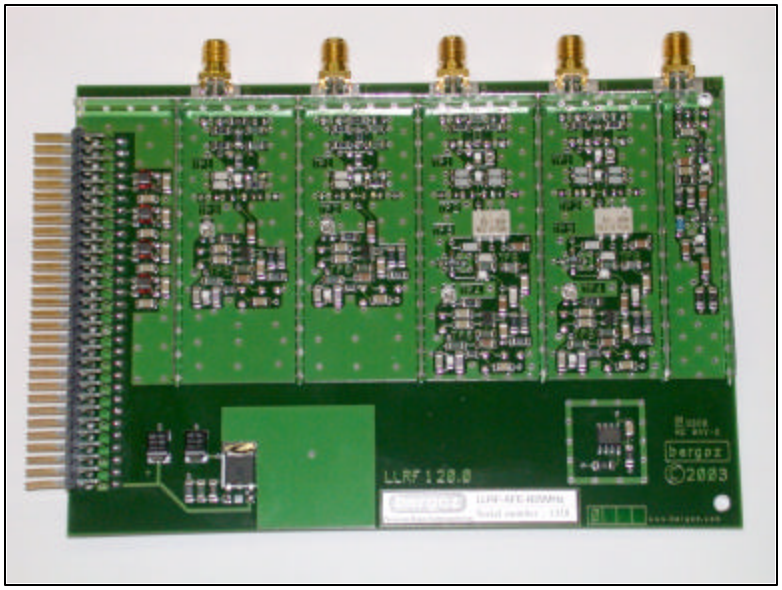
LLRF VXI Crate

- IOC
- Timing Module
- High Power Protection Module
- RF Multiplexers

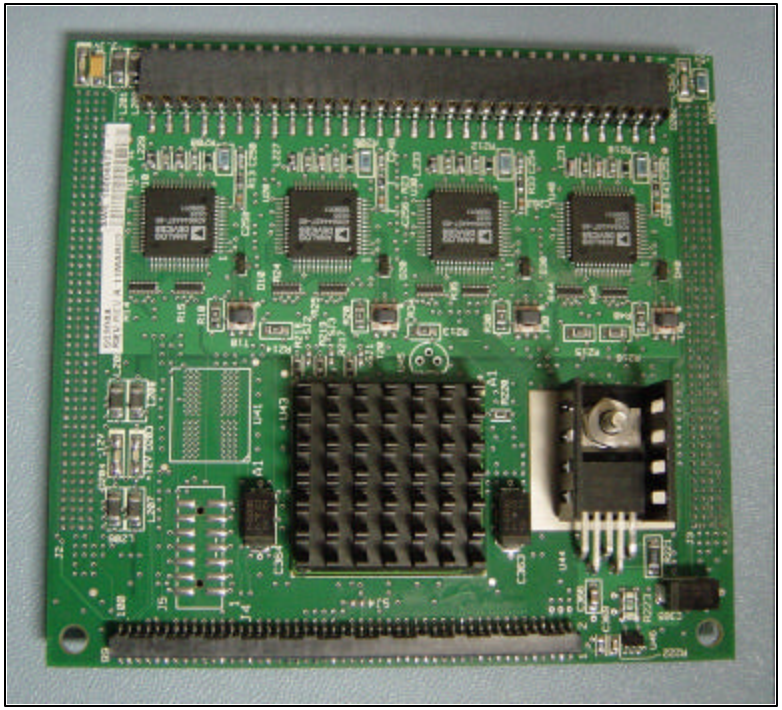
Downconversion / Distribution Chassis

Control Chassis

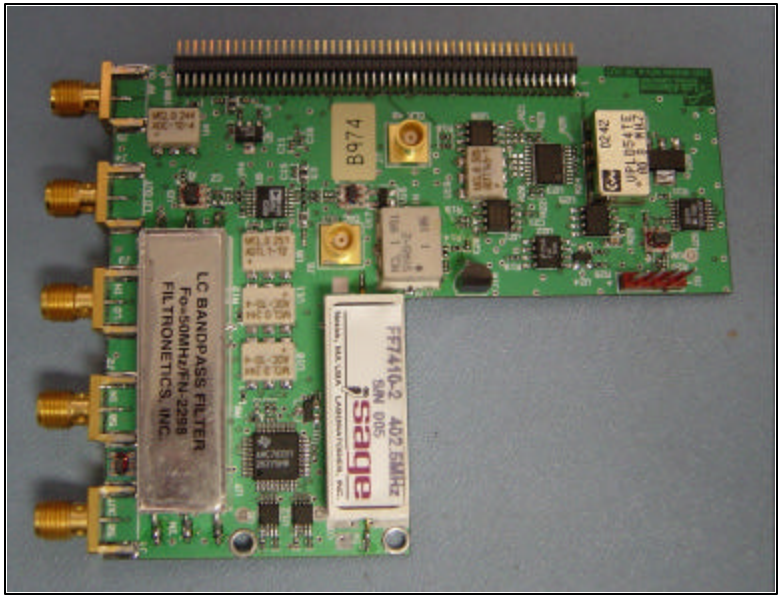
Analog Front End, Digital Front End and RF Output Prototypes are Undergoing Bench and System Testing



Analog Front End (AFE)

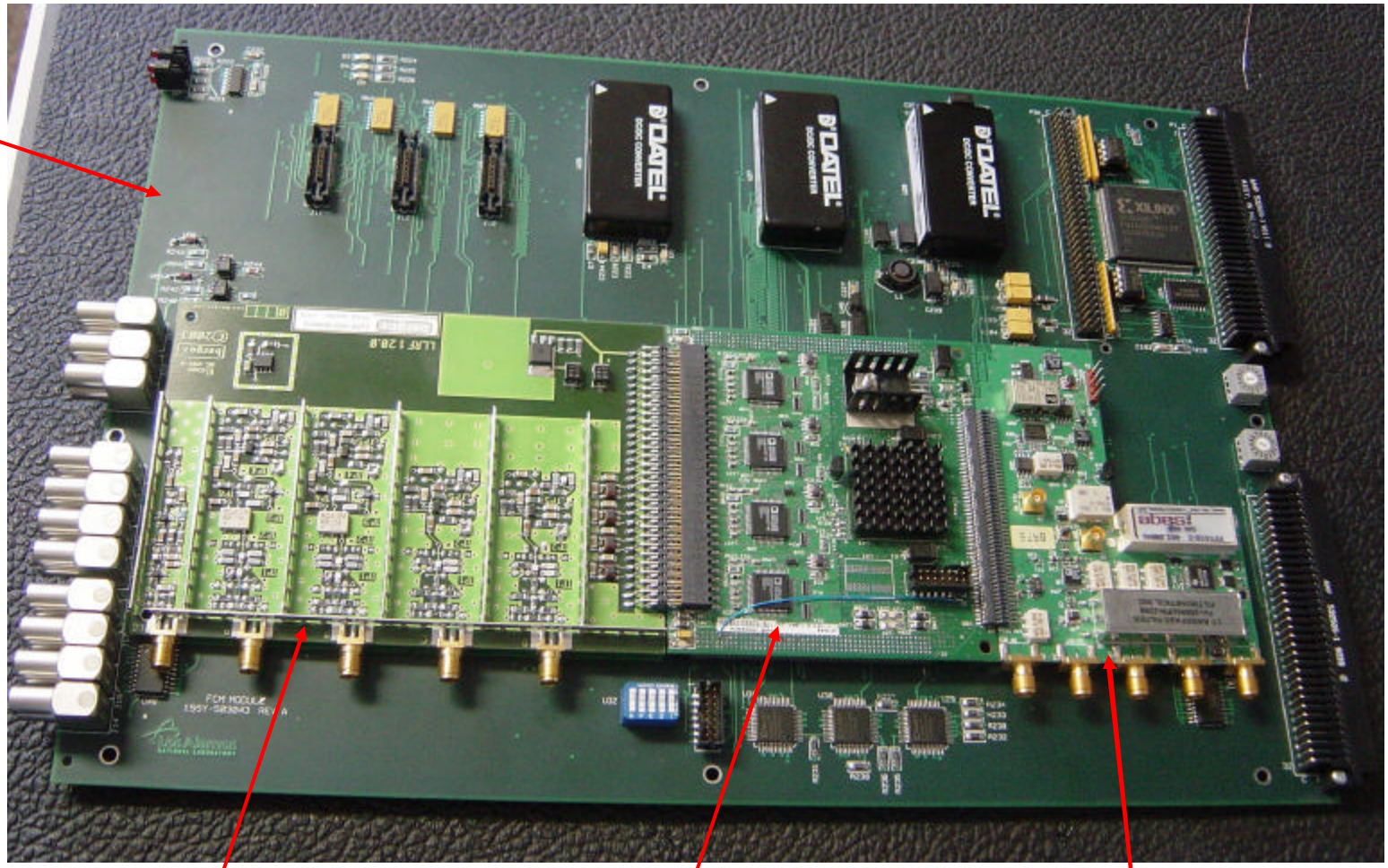


Digital Front End (DFE)

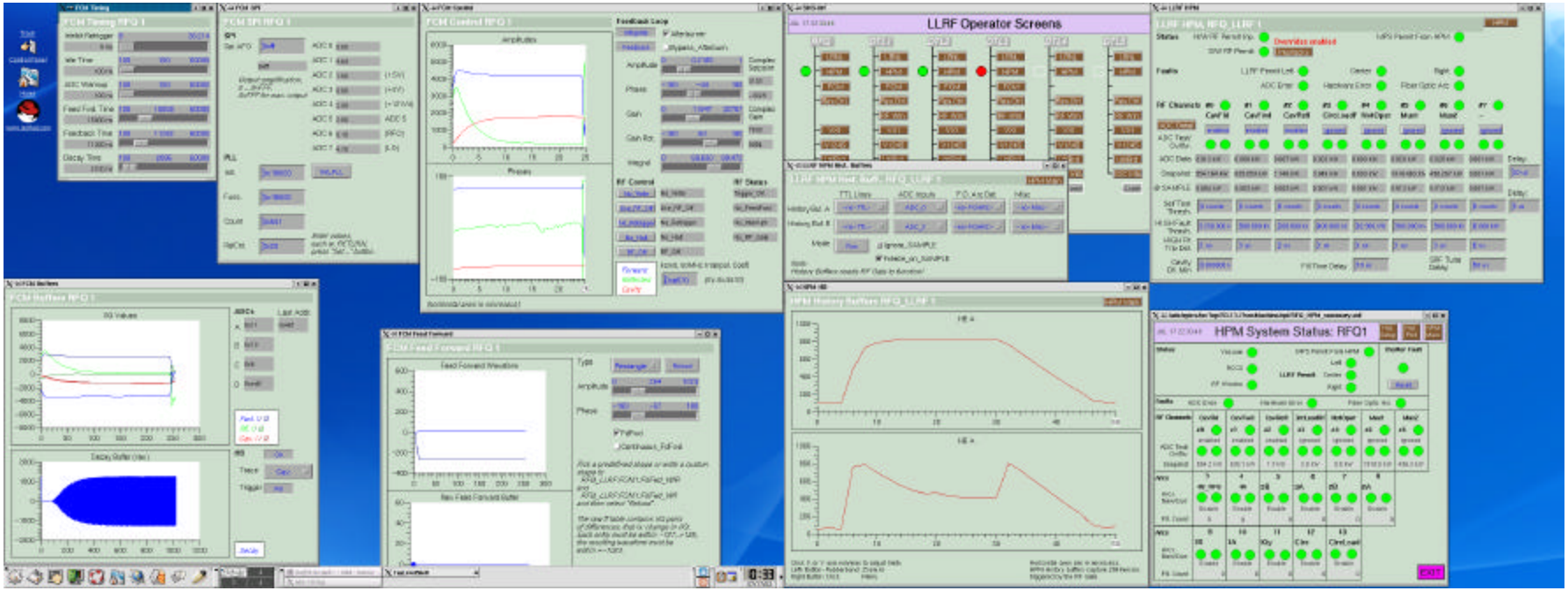


RF Output (RFO)

Prototype Field Control Module (FCM)



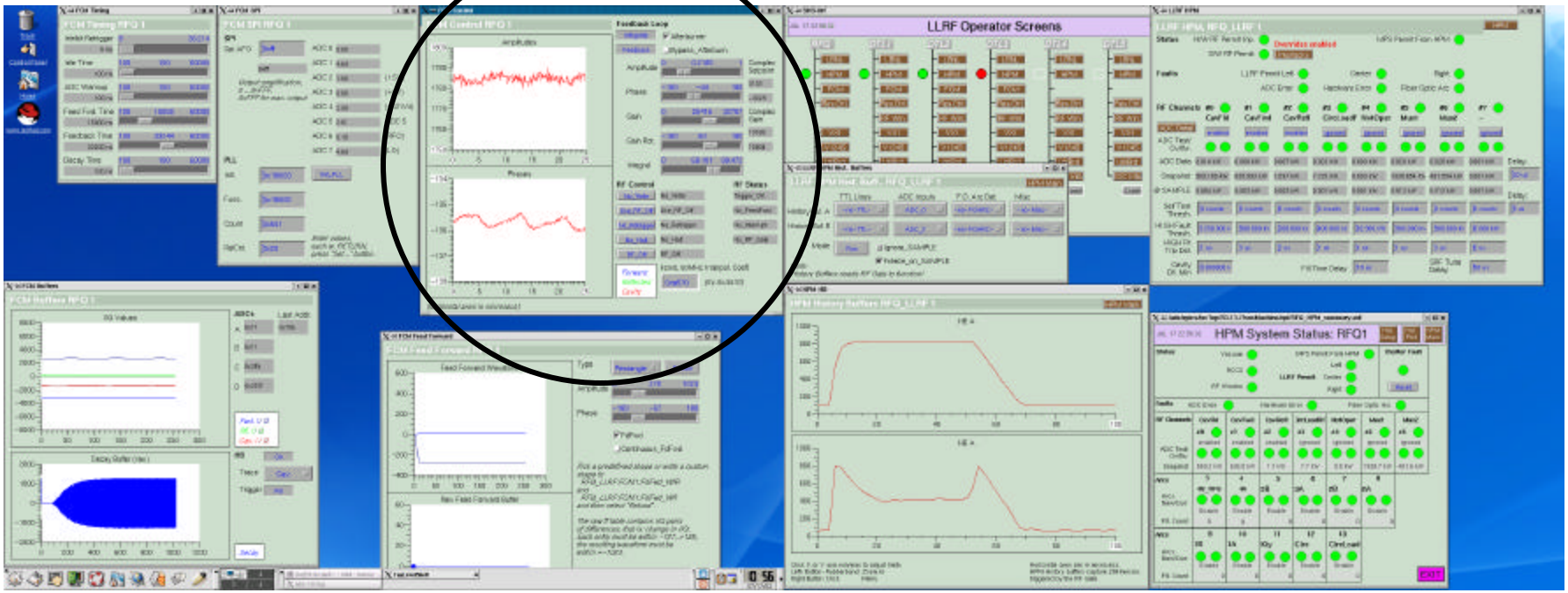
Closed-Loop Feedback Control Demonstrated on RFQ July 17, 2003



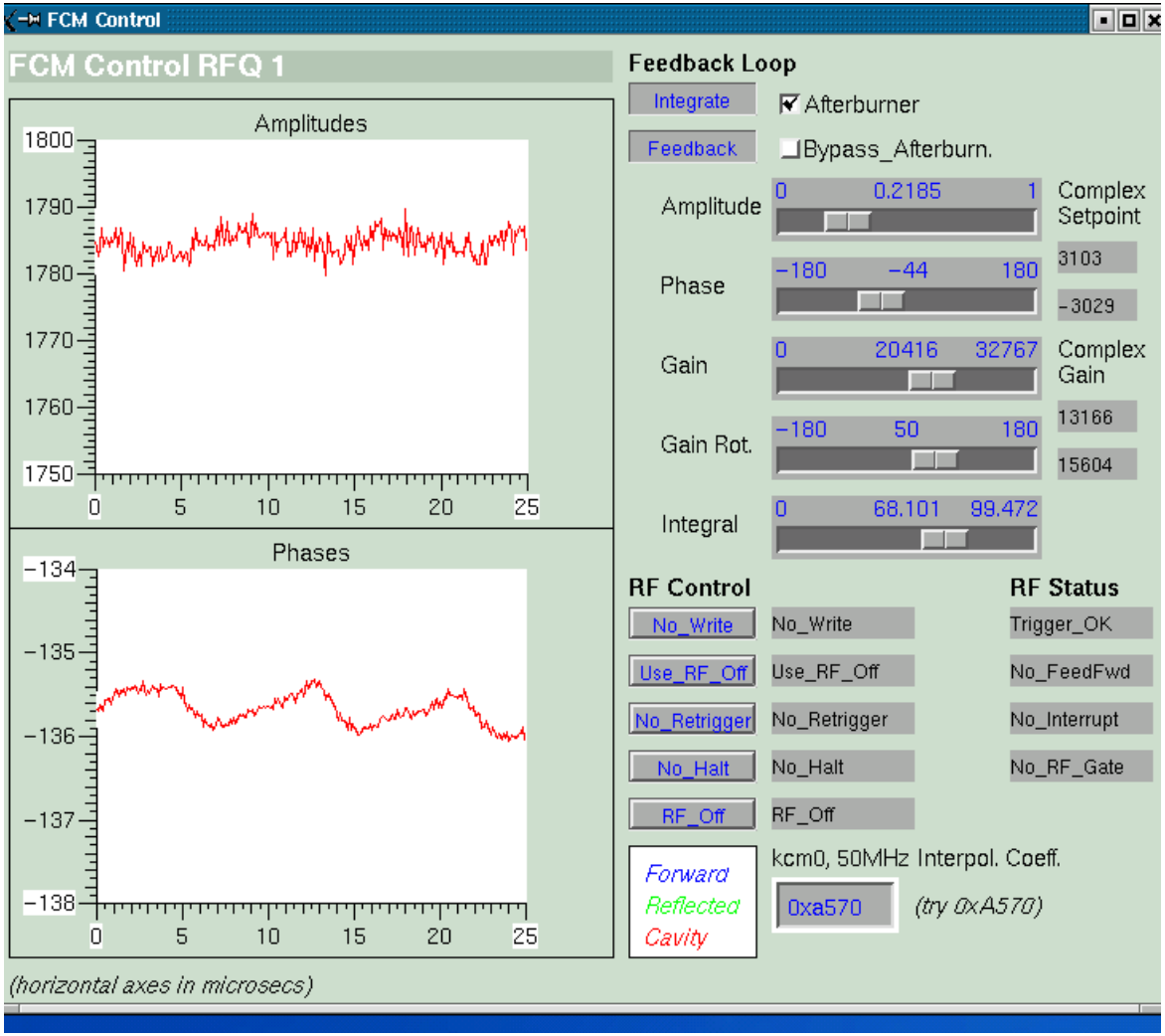
Closed loop operation. 15 us feedforward-only followed by 11 us of feedforward and feedback. 636 kW, 15 Hz.

Field Regulation of ±0.3 % and ±0.5 deg After the Turn-on Transient has Settled Out

See detail on next slide.



Field Regulation of ±0.3 % and ±0.5 deg After the Turn-on Transient has Settled Out – Detail View



Status – New Hardware Development

- The Rev B Field Control Module (FCM) production package was turned over to the vendor last week for fabrication of five sets of hardware. This includes the VXI carrier board, the Digital Front End (DFE), and the RF Output (RFO). Delivery is planned for mid-August.

- We now have two FCMs running at ORNL; one FCM was delivered to LBNL last Friday; and two FCMs reside at LANL.

- We plan to do more testing of the FCM at the SNS site as soon as possible. We'll begin with the RFQ with beam, and will then proceed to either DTL1 or 3 as schedule permits. We are working hard to implement a new version of the history buffers which eliminates the familiar data decimation and provides for real averaging and the "look and feel" of a digital scope. The history buffers must be completed prior to the next test with the RFQ so that we can observe full 1 ms pulses.

Status – Other Efforts

High Power-Protect Module (HPM)

- The ORNL team is undertaking a small production run of Rev D HPMs with a local vendor in advance of completion of the Rev F HPMs at LANL (prototypes presently under test). This will get us through the short term goal of completing the DTL installation and will give us experience with this local vendor, who will likely be on the bid list for production of ~100 systems later this year.

Operations

- The LLRF control EPICS screens at the site were prone to lockup for unknown reasons. This has been repaired (so far) by moving the underlying code from the LLRF VXI IOCs to a separate server that is running the next revision of EPICS (R3.14.1)

MEBT Rebunchers

- A new connector adapter was designed and procured to replace the ribbon-cable version in the 1st generation control chassis. This has been installed on the spare chassis, which is in the lab for test and repair. This new adapter should provide for more reliable operation of the chassis and will be fitted to the four installed chassis after successful lab testing.